EPA/ROD/R04-94/199
1994

EPA Superfund
Record of Decision:

MILAN ARMY AMMUNITION PLANT
EPA ID: TN0210020582
OU 03
MILAN, TN
09/30/1994

Text:

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Northern Boundary Groundwater, Milan Army Ammunition Plant (MA
(Operable Unit 3)

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected interim remedial
Groundwater, Milan Army Ammunition Plant, Milan, Tennessee. The sel
was
chosen in accordance with the requirements of the Comprehensive Envi
Compensation, and Liability Act of 1980 (CERCLA), as amended by the
Reauthorization Act of 1986 (SARA), and to the extent practicable, t
Substances Pollution Contingency Plan (NCP, 40 CFR 300). This decis
factual
basis for selecting the remedy for the Northern Boundary Groundwater
decision. This decision is based on the Administrative Record for t

The U.S. Environmental Protection Agency and the State of Tenn
remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from thi
implementing the response action selected in this Record of Decision
and substantial endangerment to public health welfare, or the enviro

DESCRIPTION OF THE REMEDY

The goal of the cleanup activities at the northern boundary of
of explosives compounds off the facility property and reduce the lev
groundwater in this area. The remedy consists of extraction of cont
reduce the levels of explosives compounds to the effluent discharge
water to the nearby river in compliance with State regulations. Thi
downgradient edge of explosives-contaminated groundwater. The upgra
contaminated groundwater will be studied and addressed under separat

The groundwater at the northern facility boundary is part of O
consists of the northeast portion of the facility (formerly designat
the
industrial and disposal areas within OU3 is currently underway. OU3
contaminant sources than the other OUs at MAAP, which are OU1 (groun
downgradient of the O-Line Ponds) and OU2 (soil, surface water, and
area).
Response actions are presently underway to address OU1 and OU2.

The major components selected for remediating groundwater at t
as follows:

Removal of contaminated groundwater from the aquifer us

On-site treatment of extracted groundwater using filtra and associated inorganic constituents, and granular act the explosives compounds;

Discharge of treated groundwater to the Rutherford Fork

Groundwater monitoring and effluent monitoring to deter effectiveness; and

Institutional controls to prevent human exposure to the

The principal threat at this site, groundwater contaminated wi addressed by removing contaminated water from the aquifer and perman with GAC to remove explosives contaminants. In pursuit of the overa concentrations of explosives contaminants to levels that will be pro
proven
technology, will be used to remove explosives compounds from extract was selected because of its known ability to reduce contaminant conc protective of human health and its cost-effectiveness in comparison the relatively low concentrations of explosives compounds detected i

This interim remedial action will consist of the interception contaminated groundwater at the northern boundary of MAAP to control
explosives
compounds. Therefore, this action is expected to be consistent with

STATUTORY DETERMINATIONS

This interim action is protective of human health and the envi State applicable or relevant and appropriate requirements (ARARs) fo cost effective. This interim action utilizes permanent solutions an
maximum
extent practicable.

Because this remedy will result in hazardous substances remain levels, a review will be conducted within five years after commencem
the
remedy continues to provide adequate protection of human health and is an interim action ROD, review of this site and of this remedy wil remedial alternatives for groundwater.

Joseph W. Albright Date
Lieutenant Colonel, U.S. Army
Commanding Officer, Milan Army Ammunition Plant

Lewis D. Walker Date
Deputy Assistant Secretary of the Army
(Environment, Safety, and Occupational Health

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

345 COURTLAND STREET, N.E.
ATLANTA, GEORGIA 30365
SEP 30 1994

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

4WD-FFB

Mr. Lewis D. Walker
Deputy Assistant Secretary of the Army
(Environmental Safety and Occupational Health)
ATTN: SAILE-ESOH
The Pentagon, Room 2E577
Washington, D.C. 20310-0110

SUBJ: OU-3 Boundary Groundwater
Interim Action Record of Decision
Milan Army Ammunition Plant, TN, NPL Site

Dear Mr Walker:

The U.S. Environmental Protection Agency (EPA) has reviewed the Interim Action Record of Decision for Operable Unit 3 (OU-3) Boundary Groundwater pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986. EPA concurs with the finding and selected remedy presented in the Interim Action Record of Decision. The Army will issue a Final Record of Decision (ROD) containing the final remedial action for OU-3. The Final ROD may include this selected remedy to address all of OU-3 groundwater.

In conjunction with the action taken in this Interim ROD to correct past contamination problems, EPA would like to review with the Tennessee Department of Environment and Conservation and the Milan Army Ammunition Plant (MAAP) options for minimizing and eliminating discharge of explosive contaminated waste water. The review must be done prior to the re-issuance of the National Pollutant Discharge Elimination System permit for the Milan facility in the next year.

Sincerely,

John H. Hankinson
Regional Administrator

cc: Commissioner J. A. Luna,
Tennessee Department of Environment and Conservation
Lieutenant Colonel Joseph W. Albright
Commanding Officer, Milan Army Ammunition Plant

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STATE Of TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Superfund
401 Church Street
4th Floor, L&C Annex
Nashville, TN 37243-1538

September 14, 1994

Mr. Lewis D. Walker
Deputy Assistant Secretary of the Army
OSHA-I, LE
Office of the Assistant Secretary
Department of the Army
Washington, DC 20310-0103

Dear Mr. Walker:

RE: 27-505 Milan Army Ammunition Plant
Interim Action Record of Decision for OU3

The Tennessee Department of Environment and Conservation (TDEC) has
Action Record of Decision submitted September 12, 1994. This docume
containment and treatment of groundwater contaminated with explosive

OU3

northern boundary area. The Department concurs with the findings an
stated in this Record of Decision.

If you should have any questions regarding this matter, please conta
Sells, TDEC Project Manager at (901) 661-6204.

Sincerely,

Clinton W. Willer
Director
Division of Superfund

CWW/svw WALKER

cc: TDSF - JFO
TDSF - NCO
EPA IV - Attn: Peter Dao

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1.0   SITE NAME, LOCATION, AND DESCRIPTION

Milan Army Ammunition Plant (MAAP) is located in western Tenn Tennessee, and 28 miles north of Jackson, Tennessee (Figure 1-1). M contractor-operated (GOCO) installation with Martin Marietta Ordnanc contractor. The facility was constructed in 1941 to produce and sto large-caliber ammunition. At present, the facility comprises 22,436

Of the thirteen process areas active at the end of World War As shown in Figure 1-2, the active process areas are distributed thr The southern portion of the facility contains numerous storage areas remedial action is also marked on this figure.

MAAP lies within the coastal plain province of the Mississipp Valley of the Tennessee River and east of the Mississippi River Vall surrounding area is gently rolling to flat. It slopes regionally we streams, creeks, and drainage ditches. The elevation of the plant v
590
feet above mean sea level (ft-msl) on the south side to a low of app

boundary of the plant.

Numerous perennial and ephemeral surface water features occur
to the north-northwest. The entire facility, except for its extreme
creeks
and ditches to the Rutherford Fork of the Obion River. The northern
well-developed, ephemeral, natural drainage bodies that join the Rut
boundary of the installation. The two parent streams, the Forked De
into the Mississippi River about 60 miles west of MAAP.

Groundwater is a primary source of potable and non-potable wa
At MAAP, the Memphis Sand formation of the Claiborne Group is the ma
thick, laterally continuous, and highly transmissive. Groundwater f
the west, in the direction of regional dip of these sands, and also
topographic influence. On a general scale, there are no abrupt hydr
Locally, the clay lenses and clay rich zones may alter vertical grou
sediments tends to make vertical conductivities lower than horizonta

The facility is located in a rural area, with agriculture bei
scattered residences to the north and east of the facility boundary.
residences are located north of the Rutherford Fork, which may act a
shallow aquifer zones. These residences are downgradient from the t
approximately 1.5 miles from the northern facility boundary. On the
are located along the facility property line. These homeowners are
contamination at the northern facility boundary because they are cro
both areas of concern. Within the facility, the Army performs regul
production wells to ensure that no contamination is present. Theref
conditions,
humans are not exposed to the contaminated groundwater near the nort
exposures to contaminated groundwater under future land use scenario
health effects if the property is developed for residential use.

<IMG SRC 0494199>

<IMG SRC 0494199A>

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The initial construction of the installation was completed in
operated continuously since that time. MAAP is a GOCO military indu
jurisdiction of the Commanding General, Headquarters, United States
Chemical Command. Presently, MAAP is operated by Martin Marietta Or
current level of employment at MAAP is about 1,600 workers.

MAAP facilities include thirteen active and inactive ammuniti
packaging (LAP) areas (of which seven are in use at present); one wa
experimental

area; one central x-ray facility; one test area; two shop maintenanc
12 aboveground, earth-covered igloo magazine storage areas; a demoli
administrative area; a family housing area; and recreational facilit
facilities, fire/ambulance stations, 10 high pressure heating/proces
heating
plants, and 6 pink water treatment facilities (PWTFs). There are tw
the facility: Wolf Creek Ordnance Plant (WCOP) treatment plant in t
Milan Ordnance Depot (MOD) sewage treatment plant in the south. A l
by on-site personnel while working with explosives/propellants is lo
plant, a coal pile, a storage pond, and a treatment plant for coal p

In the past, industrial wastewater from various production ac
ditches that drained from sumps or surface impoundments into both in
and rivers. MAAP currently treats all process water from the indust
contaminated wastewater in the six PWTFs. This wastewater is proces
adsorption
systems and is discharged under the authority of a National Pollutan
(NPDES) permit.

In 1978, the U.S. Army Environmental Center (USAEC, formerly
Hazardous Materials Agency or USATHAMA) conducted an installation As
(USAEC,
1978), which consisted of a records search and interviews with emplo
wastewater from production areas, contaminated with various explosiv
discharged to and observed in facility drainage ditches. However, t
migration in surface water, rather than possible infiltration from t
concluded that there was the potential for off-post migration of con
concentrations.

Also in 1978, the U.S. Army Environmental Hygiene Agency's (U
program (USAEHA, 1978) revealed that three of MAAP's 11 water supply
with
explosives compounds. The affected wells were near a number of prod

A 1983 USAEC MAAP Contamination Survey report (USAEC, 1983) c
contamination was migrating slowly towards the northern facility bou
were
detected in groundwater samples from northern boundary monitoring we
detected
concentrations were high enough to be considered hazardous. The fac
as a possible source of groundwater contamination.

In May, 1984, because of the level of contamination in the gr
for listing on the National Priorities List (NPL). The NPL is the U
(EPA) list of uncontrolled hazardous substance releases in the Unite
term remedial evaluation and response. Final listing on the NPL too

In 1989, the Army, EPA, and the Tennessee Department of Envir
entered into a Federal Facility Agreement under the Comprehensive En
Compensation, and Liability Act of 1980 (CERCLA) Section 120 and RCR
and
3004(v) (USEPA Region IV, et. at., 1989). The purpose of this agree

environmental impacts at the site are investigated and that remedial
health, welfare, and the environment.

In 1990-1991, the USAEC conducted a Remedial Investigation (R
The
RI was conducted to identify the type, concentration, and extent of
All of the existing and newly-installed monitoring wells along the n
during
the RI. One of these groundwater samples contained explosives compo
9-33 æg/L. Upon resampling this well in the summer of 1993, the con
the
groundwater sample was 68.1 æg/L. Due to this increase, and due to
compounds in other boundary monitoring wells, the Army has been acce
groundwater quality at the northern boundary.

To respond as rapidly as possible to potential off-site migra
contaminated groundwater at the northern facility boundary, the Army
at the northern facility boundary while further investigation of oth
1994,
a Focused Feasibility Study (FFS) of the northern boundary groundwat
1994a).
The purpose of the FFS was to identify remedial technologies that ar
of mitigating the risks posed by contaminated groundwater at the nor
the information gathered and presented in the FFS report, the Army h
contaminated northern boundary groundwater. The rationale behind se
presented to the public in a Proposed Plan (USAEC, 1994b).

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI report for MAAP was released to the public in December
meeting held during the same month. The FFS report and Proposed Pla
groundwater were released to the public on July 1, 1994. All of the
information about environmental studies at MAAP, are available in bo
the
information repository maintained at the Army Chief Engineer's Offic
Fields
Library, Milan, TN. The notice of availability of these documents w
Exchange on June 22, 1994 and the Jackson Sun on June 22, 1994.

A 30-day public comment period was held from July 1,1994 thro
a public meeting was held on Tuesday, July 12, 1994. At that meetin
EPA,
and the TDEC answered questions about problems at the site and the r
consideration. Comments and responses from the July 12, 1994, Publi
the meeting transcription, which is included in the Responsiveness S

This decision document presents the selected remedial action
facility boundary, MAAP, Milan, TN. The remedial action has been ch
CERCLA,
as amended by the Superfund Amendments and Reauthorization Act of 19
practicable, the National Oil and Hazardous Substances Pollution Con
decision

for this site is based on the Administrative Record.

4.0 SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

Past disposal practices at MAAP have resulted in soil and gro facility. The goal of the overall cleanup activities at MAAP and af levels of contaminants to concentrations that are protective of huma effects will result from future use of the facility and/or any off-p as a result of operations at MAAP.

The groundwater at the northern facility boundary is part of consists of the northeast portion of the facility (the area north of defined by the NCP (40 CFR 300.5) as a discrete action which is an i comprehensively mitigating site problems. Further investigation of within OU3 is currently underway. OU3 is composed of different areas and c OUs at MAAP, which are OU1 (groundwater immediately downgradient of (soil, surface water, and sediment in the O-Line Ponds area). Respo to address OU1 and OU2.

There are two areas of concern at the northern facility bound is located in the Milan National Guard Training Area, and the wester Area M and the Wolf Creek Ordnance Plant (WCOP) sewage treatment pla presents specific remedies that were considered for the two areas of northern facility boundary.

At present, the groundwater at the northern boundary of MAAP water. However, there are currently no restrictions in place to pre use of groundwater as drinking water. If the groundwater at the MAA drinking water, it is possible that long-term usage could potentiall addition, the hydrogeological information from the site indicates th undertaken, the contaminated groundwater will continue to migrate toward the nor area of groundwater contamination has been separated from other area the Army to begin groundwater cleanup at the northern boundary prior OU3 area

The clean-up objectives for groundwater at the northern bound contaminated groundwater from MAAP to other areas and to reduce the in northern boundary groundwater. The overall strategy consists of and treating it to reduce the levels of explosives compounds to conc to the Rutherford Fork of the Obion River. In pursuit of the overal contaminants to health-based levels, granular activated carbon (GAC) to remove explosives compounds from the extracted groundwater. This of its ability to adequately and economically remove explosives cont effluent discharge levels.

The Army has elected to perform this phase of groundwater cle which allows for design, construction, and operation of a treatment the OU3 groundwater contamination. After all suspected contaminants been investigated, a final remedy will be selected for OU3 which sat

levels
or provides technical data, consistent with CERCLA and the NCP, whic
The practicability of aquifer restoration will be determined prior t
ROD
for OU3.

The interim remedial action will greatly reduce the potential could result from use of the groundwater as drinking water. Treatme explosives contaminants, thereby reducing the toxicity and volume of addition, groundwater extraction will control the off-site migration

This interim remedial action is consistent with any planned f the further migration of contaminated groundwater at the northern fa concentrations of contaminants in groundwater. In addition, it will remedies that may be implemented in the future to address other conc groundwater remedy for OU3 will be published in a subsequent Record

5.0 SITE CHARACTERISTICS

This section provides an overview of the site characteristics of OU3, including a summary of the hydrogeologic setting and the nat contamination. The information presented in this section was summar
and
the FFS (USAEC, 1994a).

5.1 HYDROGEOLOGIC SETTING

The major aquifer at MAAP occurs within the Memphis Sand of t deposits of Tertiary age in the Gulf Coastal Plain of western Tennes unconfined aquifer is approximately 250 feet in the areas of interes groundwater movement are the dip of the sediments, surface topograph discharge patterns. On a regional scale, groundwater flow is genera regional dip of these sands, and also trends northerly because of th of the sands is estimated to be about 20 feet/mile to the northwest. abrupt hydrologic boundaries in the aquifer. The sandy formation co zones which may locally alter vertical groundwater flow, and stratif make vertical conductivities lower than horizontal conductivities.

Groundwater flows in a direction perpendicular to groundwater northern boundary of MAAP, these contour lines run roughly east-west groundwater flow direction is toward the north. The groundwater flo
hydraulic
gradient, i = h/ L, (i.e., the hydraulic head over a given distance the hydraulic conductivity, K. As part of the O-Line Ponds investig
high-
rate pump tests, and a recovery test were conducted using a test ext Line Ponds area (USAEC, 1992). The average K value from analysis of

The horizontal hydraulic gradient is very low at MAAP. Horiz MAAP range between 0.0012 ft/ft and 0.0023 ft/ft. The hydraulic gra estimated to be 0.0023 ft/ft because of the close proximity of this

Effective porosity, which is the interconnected porosity in t the flow of groundwater, has an average value of 20%. Based on aver for the aquifer at MAAP, an average groundwater flow velocity for th calculated. Using an effective porosity of 20%, an average gradient value of 57 ft/day, the average groundwater flow velocity at the northern

Groundwater is recharged primarily by infiltration of precipi portion of the site and, to a lesser degree, infiltration from the f of groundwater discharges to the Rutherford Fork of the Obion River and Johns Creeks, which both flow into the Rutherford Fork. It is evide elevations of the ground surface, the water table, and the stream su some flow to the surface water bodies. However, given the vertical only the shallow portion of the aquifer is discharging to the surfac of the aquifer flow toward regional discharge areas. It has been es groundwater in the Memphis Sand aquifer discharges to the Rutherford remainder likely continues to flow north.

5.2 CONTAMINATION ASSESSMENT

The remedial action specified in this ROD addresses only the boundary; groundwater in other areas of the facility (e.g., producti addressed by separate actions. This section focuses on the levels o in northern boundary groundwater.

The results of the RI (USAEC, 1991) and more recent sampling (USAEC, 1994a) indicate that the principal sources of explosives con northern boundary are the drainage ditches that flow through this ar the installation contains organic contaminants, specifically the exp 2,4,6-trinitrotoluene (2,4,6-TNT), HMX, RDX, nitrobenzene, 2,4-dinitrotoluene (2,4-DNT),1, (1,3,5-TNB), and 1,3-dinitrobenzene (1,3-DNB). Of these contaminants, RDX, 2,4-DNT, the highest concentrations and/or pose the greatest risk.

Because drinking water wells are not currently located in the there is currently no risk posed to facility workers or area residen assessment (RA) conducted as part of the FFS (USAEC, 1994a) indicate contamination in groundwater may pose a threat to human health shoul residential use in the future. Contaminant migration beyond the ins unacceptable adverse health effects for off-post residential use of summarizes the RA and discusses the potential routes of human and en contaminants in the northern boundary groundwater.

5.2.1 Summary of Remedial Investigation Results

The results of chemical analysis of groundwater samples colle indicate that explosives compounds are detectable in groundwater at

facility boundary of MAAP. A groundwater sample collected from moni
Figure
5-1) contained a concentration of 28.8 æg/L of RDX. Additionally, a
monitoring well MI060 contained 1.49 æg/L of 2,4-DNT. The compounds
1,3,5-TNB
were also detected in groundwater samples collected from northern bo

5.2.2 Summary of Post-RI Sampling and Analysis

To determine the changes in contaminant concentrations over t vertical and horizontal extent of groundwater contamination at the n monitoring wells were installed and sampled in the fall of 1993. Th in each of the monitoring wells located on or near the northern boun Monitoring well locations, as well as the concentration of total exp groundwater samples collected from these monitoring wells in late 19 results of chemical analysis of the groundwater samples for explosiv 5-2. The concentrations of metals detected in these samples are pre

These recent sample results show that groundwater contaminati increased in magnitude and extent between the 1990 RI and the presen the sample collected from MI060 (screened from 141 ft to 151 ft belo æg/L of total explosives, which is more than seven times higher than RI in 1990. The concentration of 2,4,6-TNT in well MI060 had increa
RDX
had increased from nondetectable to 26.6 æg/L; and 1,3,5-TNB had inc æg/L.

<IMG SRC 0494199B>

TABLE 5-1
Screen Depths and Depths to Water in Northern Monitoring Wells

Well ID	Depth of Well Screen Interval (ft below ground surface)	Depth of (ft below g
MI029	30.00 - 60.00	3
MI140	135.00 - 145.00	4
MI025	47.00 - 77.00	4
MI141	150.00 - 160.00	5
MI142	25.00 - 35.00	3
MI143	130.00 - 140.00	3
MI059	18.05 - 28.05	1
MI060	140.78 - 150.78	1
MI061	235.20 - 245.20	1
MI030	31.50 - 61.50	1

MI137	120.00 - 130.00	1
MI046	157.00 - 177.00	1
MI047	214.50 - 234.50	1
MI111	11.00 - 21.00	1
MI023	30.00 - 60.00	3
MI051	135.00 - 155.00	4
K-100	137.00 - 188.40	3
MI105	25.00 - 35.00	2
MI146	139.40 - 149.40	3
MI107	17.00 - 27.00	1
MI138		1
MI106	22.00 - 32.00	2
MI048	27.80 - 47.80	2
MI031	31.50 - 61.50	1
MI032	40.00 - 70.00	3
MI139	130.00 - 140.00	3
MI079	44.22 - 54.22	3
MI080	38.92 - 48.92	3
MI125	15.79 - 25.79	
MI126	88.67 - 98.67	
MI127	186.5 - 196.5	2

Table 5-2

Concentrations of Explosives Compounds Measured In Nort Samples (æg/L)

WELL ID	1,3-DNB	2,4-DNT	2,6-DNT	HMX	1,3,5-TNB	2,4,6-TNT
K-100	7.43	6.23	<0.074	14.1		
MI023	<0.611	<0.064	<0.074	<1.21	<0.635	
MI025	<0.611	<0.064	<0.074	<1.21	<0.635	
MI029	<0.611	<0.064	<0.074	<1.21	<0.635	
MI030	<0.611	<0.064	<0.074	<1.21		

<0.635

MI031	<0.611	0.205	<0.074	<1.21	0.919	
MI032	<0.611	0.102	<0.074	<1.21	1.43	
MI046	12.0	45.3	<0.074	159.0	3340.0	
MI047	<0.611	0.138	<0.074	<1.21	3.25	
MI048	<0.611	<0.064	<0.074	<1.21	1.28	
MI051	14.5	47.0	<0.074	44.0	2630.0	
MI059	<0.611	<0.064	<0.074	<1.21	<0.635	
MI060	<0.611	2.10	<0.074	3.23	34.6	
MI061	<0.611	<0.064	<0.074	<1.21	<0.635	
MI079	<0.611	<0.064	<0.074	<1.21	1.06	
MI080	<0.611	<0.064	<0.074	<1.21	<0.635	
MI105	<0.46	<0.40	<0.60	<0.53	<0.43	
MI106	<0.46	<0.40	<0.60	<0.53	<0.43	
MI107	<0.46	<0.37(1)	<0.60	<0.53	2.74(C)	
MI111	<0.46	<0.40	<0.60	<0.53	<0.43	
MI125	<0.46(D)	<0.40	<0.60(D)	<0.53(D)	1.08(C,G)	<0.43(D)

Table 5-2 (co

Concentrations of Explosives Compounds Measured In Nort Samples (æg/L)

WELL ID	1,3-DNB	2,4-DNT	2,6-DNT	HMX	1,3,5-TNB	2,4,6-TNT
MI126	<0.46	<0.40	<0.60	<0.53	<0.43	
MI127	<0.46	<0.40	<0.60	<0.53	<0.43	
MI137	<0.611	<0.064	<0.074	<1.21	<0.635	
MI138	<0.611	<0.169	<0.074	<1.21	1.90	
MI139	<0.611	<0.064	<0.074	<1.21	<0.635	

MI140	<0.611	<0.064	<0.074	<1.21	<0.635
MI141	<0.611	<0.064	<0.074	<1.21	1.59
MI142	<0.611	<0.064	<0.074	<1.21	<0.635
MI143	<0.611	<0.064	<0.074	<1.21	<0.635
MI146	12.6	33.2	<0.074	821.0	3500.0

Notes/Data Flagging Codes:
(1) - Results less than Certified Reporting Limit, but greater than c
(B) - Analyte found in blank as well as sample.
(C) - Analysis was confirmed.
(D) - Duplicate sample or test name.
(G) - Analyte found in rinse blank as well as sample.
(U) - Analysis is unconfirmed.

Concentrations of Metals In Northern

Sample ID	Arsenic III (ug/L)	Cadmium (ug/L)	Chromium Total (ug/L)	Chromium (VI) (ug/L)	Copper (ug/L)	Selenium (ug/L)	Zinca (ug/L)	Cyanide	Date Sampled
MI030	<2.5	<4.0	7.7	<2.5	<8.1	<2.5			8/17/93
	<2.5	<4.0	<6.0	--	<8.1				11/11/90
MI031	--	<4.0	<6.0	<2.5	--				8/17/93
	--	<4.0	9.8	--	--				
MI032	--	<4.0	<6.0	<2.5	--				9/06/93
	--	<4.0	<6.0	--	--				
MI059	--	<4.0	<6.0	<2.5	--				8/17/93
	--	23	<6.0	--	--				
MI060	--	<4.0	7.1	<2.5	--				8/18/93
	<2.5	<4.0	<6.0	--	<8.1				11/30/90
MI061	--	<4.0	<6.0	<2.5	--				8/18/93

	--	18	6.1	--	--		
MI079	--	<4.0	6.1	--	--		10/22/93
	--	<4.0	8.4	--	--		
MI080	--	<4.0	23	--	--		10/22/93
	--	<4.0	<6.0	--	--		
MI137	<2.5	<4.0	<6.0	<2.5	<8.1	<2.5	10/19/93
MI139	<2.5	<4.0	<6.0	<2.5	<8.1	<2.5	10/20/93

a. Values presented are for the dissolved form of the metal.

The samples collected in 1993 from MI079 showed little increa was detected at 26.2 æg/L and 2,4,6-TNT was detected at 1.06 æg/L; n since the RI.

Inorganic constituents (metals) have been detected in groundw facility boundary, although not at levels posing a significant healt The concentrations of metals in the groundwater are only of concern be achieved if the groundwater is extracted, treated, and discharged

5.2.3 Extent and Distribution of Groundwater Contamination

Analysis of available sampling data indicates that there are northern boundary of MAAP. These areas of concern have been designa Area. Further investigation of the northern boundary area is curren and depth of contamination prior to design of an extraction system. FFS (USAEC, 1994a) assumed that only the East and West Areas, as des groundwater remediation.

5.2.3.1 West Area. As presented in Figure 5-1, the West Area MI059/MI060/MI061. The latest groundwater sample collected from MI0 extends from 141 to 151 feet below ground surface) contained 68.1 æg/L of to direction (cross-gradient), this area of concern extends, at a maxim in the west to monitoring well cluster MI030/MI137 in the east. The di well clusters is approximately 2,200 feet. The downgradient extent known, but further investigations are underway to evaluate the north current data, it is impossible to reasonably estimate the volume of requires remediation.

As indicated by the levels of explosives compounds detected i C, groundwater contamination is also present in areas far south of D

purpose of this action is to provide a means for controlling the off
area
of concern is focused on the groundwater north of Ditch C (as shown
investigations
will address the area of contaminated groundwater south of Ditch C.

Monitoring well cluster MI059/MI060/MI061 lies within the app
is likely that the concentrations of explosives compounds detected i
concentrations along the facility boundary in the West Area. Ground
shallow well and deep well within this cluster (MI059, screened from
surface),
and MI061, (screened from 235 to 245 feet below ground surface) did
above their respective detection limits. Therefore, it appears that
aquifer
is contaminated.

The contamination detected in the groundwater sample collecte
result of migration of contaminated water from Ditch C, near monitor
C
has received wastewater from Lines B and D, as well as sanitary effl
plant.
The groundwater in this area of the ditch is contaminated with high
sample collected from MI046 had 6,180 æg/L of total explosives) and
of the MI059/MI060/MI061 well cluster.

5.2.3.2 East Area. As presented in Figure 5-1, the second ar
National Guard Training Area. It includes monitoring well MI031 and
MI079/MI080. The groundwater sample collected from MI079 (screened

ground surface) contained 27.3 æg/L of total explosives. In general
compounds in shallow wells increase as the distance to Ditch 7 decre
the source of the contamination. This ditch received untreated wast
became inactive in the 1970s. The groundwater sample collected from
in this area (MI139) did not contain explosives compounds above thei
Therefore, it appears from available data that only the shallow zone
7 contains explosives compounds.

In the cross-gradient direction (east-west), the area of cont
approximately 1,500 feet wide. Further investigations are underway
contamination. With current data, the volume of contaminated ground
concern
that requires remediation cannot be reasonably estimated.

Because the purpose of the study is to evaluate the options f
of contaminants, the southern extent of the area of contaminated gro
On the north side, the area extends an unknown distance north of the

Monitoring well cluster MI107/MI138 is located immediately do
Groundwater
samples collected from these wells contained very low levels of expl
data indicate that the groundwater underlying the area between Ditch
with significant levels of explosives compounds.

6.0 SUMMARY OF SITE RISKS

A risk assessment consists of an evalution of the types and l pathways by which receptors could potentially be exposed to these co carcinogenicity of the contaminants. A quantitative estimate of the pote effects to occur in the future can be constructed from these data. In estimating th made that no remedial action would be taken to address contamination; the referred to as a baseline risk assessment. The main focus of the baseline risk as potential risks associated with the use of, and exposure to, untreated groundwater boundary of MAAP. The complete baseline risk assessment can be found in Section 3 1994a).

As discussed in Section 1.0, there are scattered residences t boundary. Downgradient of the northern boundary areas of concern, the ne located north of the Rutherford Fork and at a distance of approximately 1.5 miles Homeowners of the east side of the facility are not at risk from the conc from the facility because they are cross-gradient and/or upgradient from areas contamination. Within the facility, the Army performs regular monitoring of the potable ensure that no contamination is present. Therefore, under current conditions, h contaminated groundwater.

Homeowners in this area of western Tennessee tend not to install d than necessary to obtain sufficient quantities of water. The high permeabilit aquifer results in adequate well yield even at shallow depths within the aquifer. was made in the baseline risk assessment that on-site residents would be expo contaminants that have been detected in samples from intermediate and shallow aquifer boundary.

To evaluate the potential risks posed by all organic and inor wells were sampled in August and November of 1993. These are the most re groundwater at the northern facility boundary; therefore, the baseline ri using these data.

The first task of the baseline risk assessment was to summari ter at the northern boundary. Chemicals of potential concern were select organic chemicals and those inorganic chemicals that were not within natu concentrations. Chemicals that were the focus of the baseline risk assessment included 2, 1,3,5,-TNB, 2,4,6-TNT, and chromium. Each of these chemicals was carried through the in the baseline risk assessment. In addition to the chemicals that were the foc assessment, some organic chemicals and metals were detected in the three analyses were conducted, and also were carried through the baseline risk

Toxicity information was complied for each chemical of potent potential toxicity of each chemical as represented by quantitative oral t factors used to estimate risks. The toxicity/carcinogenicity criteria we integrated Risk Information System (IRIS) and Health Effects Assessment Summary Tabl

A reasonable maximum exposure (RME) case was evaluated in the RME case was evaluated in order to place a conservative upper-bound on th meaning that the risk estimate is unlikely to be underestimated but it may be ove carcinogens and potential adverse effects for noncarcinogens were calcula ingestion pathway, as described below. Carcinogenic risks were compared risk

range for remedial planning at Superfund sites of 1x10-4 to 1x10-6, indices were compared with a hazard index of 1.0. Hazard indices greater potential for adverse health effects.

Currently, consumption of groundwater at the northern boundar people do not presently live in this area, there are no restrictions that provide an indication of possible future risks associated with exposure to contam northern boundary, a future land-use scenario was evaluated that assumed groundwater along the northern MAAP boundary.

6.1 RESULTS OF THE RISK ASSESSMENT

The risk estimates for groundwater ingestion of the explosive land-use conditions were estimated. Child groundwater ingestion risks we risk range of 1x10-6 to 1x10-4. Adult groundwater ingestion risks were within range of 1x10-6 to 1x10-4 for all wells considered. Of the three carcinogenic exp RDX contributed most to the risks (with maximum RDX risks of 1.5x10-5 for the 3.4x10-5 for the adult resident); 2,4-DNT and 2,4,6-TNT contributed to overall risks t hazard indices were greater than 1.0 for two of the well groupings considered. organ/critical effect, the hazard index still exceeded 1.0 for the spleen (due to 2,4,6-TNT) in one instance.

The risk estimates for groundwater ingestion of the remaining groundwater under future land-use conditions were less than or at the low

risk
range of 1x10-6 to 1x10-4 for both adults and children. The hazard indic
adults
were all less than 1.0.

6.2 CONCLUSIONS

The results of the baseline risk assessment indicate that the groundwater at the northern boundary could potentially result in adverse
the
groundwater were used as drinking water by residents. Although the risks
action
levels, it is apparent from the results of periodic sampling of the wells
the
levels of explosives compounds are increasing. The concentrations of exp groundwater samples collected from monitoring wells upgradient of the nor
high
as 6,000 to 8,000 æg/L (near Line K, approximately 3,000 feet south of th
therefore,
it is likely that concentrations of explosives compounds will continue to
of
time. The baseline risk assessment therefore indicates that interception
groundwater
is warranted.

The baseline risk assessment indicates that actual or threate substances from this site, if not addressed by implementing the response may present a current or potential threat to public health, welfare, or t

7.0 DESCRIPTION OF ALTERNATIVES

Remedial alternatives for groundwater were developed to satis objectives:

Protect human health and the environment;
Attain chemical-specific ARARs and human health-based r water exposures of future groundwater uses at the nothe
Use permanant solutions and treatment methods to the ma
Achieve a remedy in a cost effective manner.

This section presents the ARARs and to-be-considered (TBC) Gu remediation at MAAP and describes the extraction systems, the treatm alternatives that have been considered for groundwater at the northe

7.1 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS AND TO-BE CONSIDERED GUIDANCE

As required by the NCP, the selected alternative must be in c are the cleanup standards, standards of control, and other substanti requirements, criteria, or limitations promulgated under Federal or hazardous substance, pollutant, contaminant, remedial action, locati

Superfund site. These ARARs will apply to the selected remedial alt groundwater.

7.1.1 Groundwater Cleanup Goals

EPA has developed chemical-specific criteria for contaminants this interim remedy. These criteria are the National Primary Drinki which are codified in 40 CFR Part 141 as part of the Safe Drinking Water A NPDWS include maximum contaminant level goals (MCLGs) and maximum co (MCLs). The MCL for nitrate is 10,000 æg/L as nitrogen (40 CFR 141.23).

The other site-related contaminants of concern in northern bo explosives compounds. Federal MCLs or State of Tennessee groundwate these compounds. Therefore, to-be-considered guidance, consisting o doses (RfDs), and cancer slope factors (CSFs) will be considered cle action. These health-based cleanup standards may not be met for thi

EPA Health Advisories (HAs) are non-regulatory concentrations at which adverse effects would not be anticipated to occur. A margi sensitive members of the population. The HA numbers are developed f noncarcinogenic end-points of toxicity. They do not incorporate qua risk from such exposure. Lifetime HAs are calculated for a 70-kg ad per day. EPA HAs are available for the principal contaminants RDX,

For the remaining contaminants of concern, risk-based chemica been developed using RfDs and CSFs from the EPA Integrated Risk Informati database (USEPA, 1988). For carcinogens and suspected carcinogens (2,4-DNT and 2, have been calculated using the assumptions of a 70-kg human and a lifetime ing per

day. For non-carcinogens (nitrobenzene and 1,3,5-trinitrobenzene), targe to the concentration that will result in no adverse health effects following drinking water. For all site-related contaminants of concern, these to-be-conside groundwater are listed in Table 7-1.

7.1.2 Surface Water Discharge Limits

EPA has adopted effluent limitations and guidelines for exist performances for new sources pursuant to Sections 301, 304, and 306 of th Control Act as amended, PL92-500. Permits developed under the National P Elimination System (NPDES) program for discharges to effluent-limited segments contai standards in accordance with these guidelines. Depending on the conditions of rece involved, individually specified effluent limitations may apply. The NPD MAAP includes

an effluent limitation for an additional pollutant, defined as total nitr
average
and 500 æg/L daily maximum.

Because of the uncertainities regarding the location and size
prevent further off-site migration of the areas of contaminated groundwat
have
not been determined. Effluent discharge limits are developed using mass
therefore,
final effluent discharge limits cannot be calculated until the details of
finalized.
To aid in evaluation of the different extraction, treatment, and discharg
discharge limits have been developed for the following situations:

Discharge into a ditch at a flow rate of 1200 gallons per min
if discharge occured directly into Ditch C and/or Ditch 7.

Discharge into the Rutherford Fork at a flow rate of 50 gpm.
extraction wells are placed very close to the leading edges o
groundwater. In this case, the required capture zone would b
would achieve the necessary degree of capture.

Discharge into the Rutherford Fork at a flow rate of 1200 gpm
extraction wells were placed at the facility boundary. A hig
the large downgradient area of contaminated groundwater.

The resulting potential chemical-specific effluent discharge
These values are based on the following assumptions:

The 3-Q-20 low flow in the Rutherford Fork is 10 cubic feet p
flow
in the ditches is 0 cfs.

The hardness of the water in the Rutherford Fork has been ass
This is the minimum hardness under the proposed revisions to
Quality Control Standards.

The background concentrations of inorganic compounds are list
exception of lead, these values were measured at Mile 2.6 of
on March 15, 1993. The value for lead is the average value f
samples collected by the TDEC from the Rutherford Fork at the
(downstream of MAAP).

Table 7-1
Chemical-Specific Cleanup Standards for the Site-Related
In Groundwater

Contaminant of Concern	MCL or Health-Based Guidance Value (æg/L)
Nitrate	10,000 as Nitrogen

141.23)

1,3-Dinitrobenzene	1
2,4-Dinitrotoluene	0.5
2,6-Dinitrotoluene	0.5
HMX	400
Nitrobenzene	20
RDX	2
1,3,5-Trinitrobenzene	2

mg/kg-

2,4,6-Trinitrotoluene	2

Table 7-2
Potential Chemical-Specific Effluent Discharg

Parameter	Stream Background Conc.2 (æg/L)	Chronic Instream Allowable (æg/L)	Fraction Dissolved	Ad Chronic Instream Al
Copper	0.90	3.62	0.35	

Limit

858

Chromium, Total	0.90	50.0	0.20	
Nickel	9.0	48.8	0.43	
Cadmium	1.0	0.38	0.25	
Lead	10.05	0.54	0.33	
Mercury	0.01	0.01	0.32	
Silver	0.19	0.37	0.35	
Zinc	2.0	32.75	0.29	
Total Nitrobodies	-	-	-	-
pH	-	-	-	- 8.5
Dissolved Oxygen	-	-	-	

1. These effluent discharge limits are preliminary and subject to c with the TDEC.

2. With the exception of lead, the stream background concentration Rockspring Branch on March 15, 1993, by the TDEC.

3. The assumed 3-Q-20 flow in the ditch is 0.

4. The 3-Q-20 flow in the Rutherford Fork is 10 cfs.

5. The value for lead is the average value from analysis of surface from the Rutherford Fork at the location of the Route 79 overpass (downstream of MAAP).

6. Because the background concentration exceeds the adjusted chroni concentration, the discharge limit has been set equal to the adjusted chronic instream allowable concen

In addition, the State of Tennessee would impose effluent dis to 8.5 pH units), dissolved oxygen (minimum of 5 ppm) and total nitr

These effluent discharge limits are preliminary and subject t with the TDEC.

7.1.3 Location-Specific ARARs

RCRA requirements regarding the location of hazardous waste t appropriate requirements for this action. These requirements cover 264.18) and placement near a fault (40 CFR 264.18).

Regulations that require Federal actions to protect floodplai wetlands (40 CFR 6, Appendix A) are relevant and appropriate require

7.1.4 Action-Specific ARARs

The disposal of sludges and spent GAC will be in compliance w 260 - 270), which are relevant and appropriate requirements for this

7.2 ALTERNATIVE 1: NO ACTION

The No Action alternative, Alternative 1, has been developed active treatment alternatives. The NCP and CERCLA, as amended by SA this alternative as a baseline for comparison of risk reduction achieved this alternative, no further action would be taken to address contam calculated in the baseline risk assessment are based on the scenario no active reduction of present or future potential risks). For the the area may be used for any purpose, including residential land use conditions, the baseline risk assessment predicts that adverse effec this alternative (i.e., hazard index greater than one) at both areas

There is no implementation time or cost associated with the N additional remedial activities will be implemented at the site.

7.3 ALTERNATIVE 2: LIMITED ACTION

The Limited Action alternative, Alternative 2, has been devel may be taken to limit human exposures to the contaminated groundwate the toxicity, mobility, or volume of contaminants, but it would redu and exposures to contaminated groundwater. The Limited Action alter the following actions:

- Institutional Restrictions;
- Public Education Programs;
- Emergency Provisions;
- Long-term Environmental Monitoring; and
- Five-year Reviews.

Institutional controls include access restrictions, deed rest Access restrictions include facility regulations to levy fines again restrictions limit the future uses at the site and require permits, safety precautions for any activities conducted in the vicinity of the site wells would be prohibited in affected areas. Education programs would be local residents of the potential site dangers. In addition, emergen would be developed for the site. These provisions would provide a p accidental exposure or sudden increase in risks at the areas of conc

Long-term environmental monitoring would be conducted along t
Groundwater samples would be collected at regular intervals from exi
be analyzed for the contaminants of concern (i.e., explosives and me
of continued off-site contaminant migration, additional sampling may
waters, and supplementary monitoring wells may be installed. Analyt
minimum of every five years to meet the NCP requirement of five-year
hazardous
chemicals remain untreated. These reports would present the analyti
of whether additional remedial actions are required at the sites.

Although this alternative does not treat groundwater and redu
alternative would limit potential human exposure to the contaminants
monitoring data, and evaluate changes in site conditions over time.
Alternative 2 are $64,000, and annual operation and maintenance (O&M
$143,000. The total present worth of this alternative is $2,262,000
5% discount rate. This cost estimate assumes that no new monitoring

7.4 COMMON ELEMENTS OF TREATMENT ALTERNATIVES 3 THROUGH 5

The remaining groundwater treatment alternatives contain seve
the "No Action" and "Limited Action" alternatives (Alternatives 1 an
considered include collection technologies, on-site treatment, and d
surface water. Contaminated groundwater will be removed from the aq
wells at each area of concern. The extracted water will be piped to
aboveground piping system. Each area of concern may have its own in
consisting of a combination of chemical and physical treatment techn
in the combination of chemical and physical processes that are used
discharge criteria; all alternatives include similar treatment to re

The Army has chosen the most promising and economical remedia
to northern boundary groundwater under this Interim Action ROD. At
will be operated such that effluent discharge levels will not be exc
therefore, off-site residents and the environment will be protected
groundwater. At the same time, institutional controls will preclude
groundwater.

The treatment technologies introduced and described in this s
to protect potential groundwater users and for their potential to re
contaminants
in groundwater to levels safe for discharge to surface water. The h
groundwater extraction and ARARs for effluent discharge relevant to
presented in Tables 7-1 and 7-2, respectively.

7.4.1 Extraction Systems

In screening technology types, extraction wells have been det
technology to extract groundwater at the northern boundary. Extract
well-understood technology that, given the highly transmissive and e
implemented along the northern facility boundary.

The locations of the extraction wells will be selected based
investigation of the northern boundary area. Because the extent of

in each area is not known, the flow rate that would be required to a known. In the FFS for this project (USAEC, 1994a), assumptions were the extraction wells and the extent of contamination to arrive at co cost estimating purposes. These estimates are based on incomplete d that changes will be made to the system during later stages of this been made to allow for relative cost comparisons between the various consideration.

Factors affecting the design of the extraction system for eac depth and thickness of the aquifer, the conductivity of the aquifer, contaminants in groundwater at the northern facility boundary. The discussed below have been developed on the basis of hydrogeologic mo boundary (USAEC, 1994a). To be conservative, costs for two separate in the cost estimates for each of the treatment alternatives.

7.4.1.1 Eastern Area of Concern. For the eastern area of con two extraction wells would be installed and would be pumped at a com

7.4.1.2 Western Area of Concern. It has been assumed that a pumped at 600 gpm for the western area of concern.

7.4.2 Estimated Influent Concentrations

At the time of the FFS, insufficient data were available to p contaminant concentrations for each area of concern. For the purpos that the influent concentration of total explosives in the West Area assumed that the influent concentration of total explosives is 100 æ results of analysis of development water collected in March 1994 aft

wells

along the northern boundary at the facility. These assumptions have purposes only.

7.4.3 Other Assumptions Used in the Cost Estimates

The on-site treatment systems are based on a proposed flow ra to reverse the groundwater gradient and, therefore, control further been assumed that two treatment systems would be constructed. It ha systems may have to operate for thirty years or more. Due to the lo extensive administrative oversight will be required to ensure the pr

of

this alternative. Long-term monitoring of influent and effluent con

and

the treatment effectiveness of the implemented alternative will be r

be

required as part of the long-term monitoring program. Institutional programs, and emergency provisions, similar to those included in Alt

Details of the treatment plant would be determined in the Rem of a treatment alternative will require the construction of a treatm building heating and lighting; long-term influent, effluent, and gro review of site conditions. The cost estimates are based on vendor i

costs.

These estimates are only preliminary estimates and are subject to ch

7.5 ALTERNATIVE 3: GMF/GAC/OFF-SITE DISCHARGE

This alternative includes all elements of the Limited Action not use the affected water as drinking water. In addition, extracti would be perfommed to control the off-site migration of the explosiv concentrations of explosives compounds in the groundwater.

The extracted water would first be filtered using a granular suspended solids, which would enhance the efficiency of the subseque

Treatment with GAC would remove explosives compounds from the first adsorption unit is the primary treatment unit, removing the ma second unit removes remaining explosives compounds to levels low eno effluent discharge levels. Each treatment system would also include service when necessary.

Spent GAC would be disposed of in accordance with applicable regulations.

This alternative would not include a treatment step for remov Therefore, for discharge into a ditch, it is possible that the efflu discharge limits. For this reason, treated water would be discharge

Obion

River where the higher discharge limits would be met. Treated water adequate removal of explosives compounds and metals.

The total net present worth of Alternative 3 is estimated at 30 years at a discount rate of 5%. This includes capital costs of $ $1,070,000

7.6 ALTERNATIVE 4: PRECIPITATION/GMF/GAC/ON-SITE DISCHARGE

This alternative includes all elements of the Limited Action not use the affected water as drinking water. In addition, extracti would be performed to control the off-site migration of the explosiv concentrations of explosives compounds in the groundwater.

The treatment system for this alternative would be similar to 3, with the addition of a precipitation process. Precipitation is a This would ensure that groundwater treated by this system would meet requirements and would allow discharge of treated groundwater direct

The chemical precipitation process introduces hydroxide or su with the metals and cause them to become heavier and ultimately sett

the bottom of the system would go through a filter press to concentr then be tested and disposed of in accordance with applicable environ

For this alternative, treated water would be discharged direc of the precipitation process would ensure that State of Tennessee ef into a ditch would be met. Treated water would be sampled to ensure compounds and metals.

The estimated capital costs for Alternative 4 are $9,882,000, estimated at $1,544,000. The total present worth of this scenario i discount rate).

7.7 ALTERNATIVE 5: GMF/GAC/ION EXCHANGE/ON-SITE DISCHARGE

This alternative includes all elements of the Limited Action not use the affected water as drinking water. In addition, extracti would be performed to control the off-site migration of the explosiv concentrations of explosives compounds in the groundwater.

The treatment system for this alternative would be similar to 3, and also includes ion exchange as an additional method for remova

Ion exchange is a process that filters water through speciali water to exchange the dissolved metals for less toxic elements. Reg occur every thirty days, producing residuals that could be shipped o accordance with applicable environmental laws and regulations.

For this alternative, treated water would be discharged direc of the precipitation process would ensure that State of Tennessee ef into a ditch would be met. Treated water would be sampled to ensure compounds and metals.

The total net present worth for Alternative 5 is estimated at at a discount rate of 5%. This includes capital costs of $11,262,00 $1,725,000.

8.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

This section evaluates and compares each of the alternatives respect to the nine criteria used to assess remedial alternatives as NCP. Each of the nine criteria are briefly described below. All of treatment and discharge of groundwater (Alternatives 3 through 5) we criteria of protection of human health and the environment and compl these

alternatives meet the primary balancing criteria to different degree relative strengths and weaknesses of the different remedial alternat comparative analysis of alternatives. As previously discussed, the

Alternative 1: No Action;
Alternative 2: Limited Action;
Alternative 3: GMF/GAC/Discharge to the Rutherford Fork
Alternative 4: Precipitation/GMF/GAC/Discharge to on-sit
Alternative 5: GMF/GAC/Ion Exchange/Discharge to on-site

8.1 NINE EVALUATION CRITERIA

Section 300.430 (e) of the NCP lists nine criteria by which e assessed. The acceptability or performance of each alternative agai individually so that relative strengths and weaknesses may be identi

The detailed criteria are briefly defined as follows:

Overall Protection of Human Health and Environment is use remedy provides adequate protection against harmful effec health or environmental risks are eliminated, reduced, or engineering controls, or institutional controls.

Compliance with ARARs addresses whether a remedy will mee relevant and appropriate requirements of Federal and Stat the remedy provides a basis for invoking a waiver.

Long-term Effectiveness and Permanence refers to the magn the ability of a remedy to maintain reliable protection o environment, over time, once clean-up goals have been met

Reductlon of Toxicity, Mobility, or Volume through Treatm performance of the treatment technologies employed in a r

Short-term Effectiveness refers to the speed with which t as well as the potential to create adverse impacts on hum during the construction and implementation period.

Implementability is the technical and administrative feas availability of materials and services needed to implemen

Cost includes both capital and O&M costs.

State Acceptance indicates whether, based on its review o Proposed Plan, the State concurs with, opposes, or has no alternative.

Community Acceptance is assessed following a review of th on the RI/FS Report and the Proposed Plan.

The NCP (Section 300.430 (f) states that the first two criter environment and compliance with ARARs, are "threshold criteria" whic remedial action. The next five criteria are "primary balancing crit

group

must be balanced. The preferred alternative will be that alternativ and the environment, is ARAR-compliant, and provides the best combin attributes. The final two criteria, state and community acceptance, evaluated following comment on the RI/FS reports and the Proposed Pl

8.2 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Current levels of groundwater contamination pose unacceptable groundwater were used as drinking water. In addition, the results o

samples collected at the northern boundary indicate that the levels
increasing. Because the concentrations of explosives in groundwater
boundary
area are high (on the order of 6,000 to 8,000 æg/L near Line K), the
compounds in OU3 northern boundary groundwater are expected to incre
(No
Action) would not meet this criterion because no actions are taken t
exposure pathways. The threshold criterion of protection of human h
not be achieved by Alternative 1. Therefore, Alternative 1 is elimi
alternatives.

Alternative 2, Limited Action, would provide some protection
implementing and maintaining access and land-use restrictions. Thes
and exposure. Because actions would be taken to prevent exposures t
to monitor the distribution and mobility of contaminants, Alternativ
of
overall protection of human health and the environment. However, im
would
not reduce contaminant levels or prevent migration of contaminants o
may not permanently reduce access to contaminated groundwater in the

Alternatives 3, 4, and 5 would protect human health and the e
contaminated groundwater, controlling mobility of contaminants, and
of these three treatment alternatives would provide protection of hu
through extraction and treatment of groundwater.

8.3 COMPLIANCE WITH ARARS

Alternative 2 would meet the threshold criterion of complianc
groundwater standards do not exist for the explosives compounds.

Each of the remaining alternatives (Alternatives 3, 4, and 5)
treatment of the groundwater, would be operated in compliance with a
that apply to groundwater treatment facilities. Under each of these
groundwater would be removed from the aquifer underlying the area no

boundary. The extraction of contaminated water would control the fu
groundwater and reduce the levels of contaminants in groundwater. T
discharged to the Rutherford Fork or the on-site ditches in complian
discharge limits. In combination with land use restrictions that wo
groundwater as drinking water, implementation of any of these altern
protection of human health and the environment.

8.4 LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative 2, Limited Action, would not provide long-term ef
human health and the environment because no action would be taken to
of explosives compounds in off-site groundwater.

Alternative 3 through 5 include groundwater extraction and tr
effective, permanent treatment of contaminants in groundwater. Howe
upgradient groundwater occurs, the natural migration of contaminated

continue. Under these conditions, continuous extraction and treatme the northern boundary would be needed.

GMF (included in Alternatives 3 through 5) would effectively material and associated inorganic contaminants from the groundwater. removed by GMF must be dewatered and disposed, but these residuals a due to the low concentrations of metals in groundwater. These resid determine proper disposal methods.

The effectiveness of the GAC system (included in Alternatives groundwater contact time with the carbon, the size and type of carbo contaminants in water. The pH of the wastewater may also affect the Most of these parameters are known based on similar applications, an effectively and permanently remove explosives compounds from the ext

Spent carbon that is generated by these systems would be disp applicable environmental laws and regulations.

Residuals generated by precipitation and ion exchange process

4 and 5, respectively, would be disposed of properly. The sludge produce process would be tested periodically to determine hazardous characteristics, a hazardous waste due to the low concentrations of toxic metals in t generated by ion exchange regeneration would be disposed of in accor environmental laws and regulations.

8.5 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternative 2, Limited Action, would not meet this criterion groundwater would not be performed.

Implementation of Alternatives 3 through 5 would result in th volume of the contaminants through treatment. The volume of contami by removing contaminated groundwater from the aquifer and treating t compounds. Mobility of contaminants would be reduced by controlling

contaminated groundwater. The combination of the GMF and GAC units precipitation, and GAC units (Alternative 4), or GMF, ion exchange a would reduce the toxicity by removing inorganic and organic contaminants f

8.6 SHORT-TERM EFFECTIVENESS

Alternative 2, Limited Action, would provide limited effectiv present, off-site residents are not exposed to the contaminated grou Alternative 2 would include land-use restrictions to preclude the us drinking water, but active control of the migration of contaminated

Construction of the extraction system, treatment facility, an through 5 would be completed with standard construction equipment an risks to workers beyond those risks inherent in construction projects. Li located within the vicinity of the site would be unaffected by the c

The length of time required to design and construct the treat alternatives would range from 18 to 24 months. This time estimate i and review, preparation of bid packages, selection of contractors an equipment installation, and start-up.

8.7 IMPLEMENTABILITY

Implementation of Alternative 2, Limited Action, would consis education programs, emergency provisions, long-term environmental mo All of these components of Alternative 2 could be readily implemente

The treatment processes that are proposed in Alternatives 3, and wastewater treatment systems and are commercially available. Ex contaminants in extracted groundwater would be adequately removed th treatment processes. Electricity is the only utility that is requir it can be made available at each site.

The extraction systems for Alternatives 3, 4, and 5 would be Government property, then they must be high-yield wells capable of s rates. If the wells are located near the leading edges of the areas lease agreement must be negotiated with the landowner to allow for i maintenance.

The treatment system for Alternative 3 would be the easiest t to the simplicity of the system. The treatment system for Alternati than that for Alternative 4 because the ion exchange system included in A automated operation and would have fewer operating and maintenance r precipitation process that is included in Alternative 4.

The treated water discharge system for Alternatives 4 and 5 w the discharge system for Alternative 3 because of the shorter distan on-site ditches and the fact that discharge would take place on Gove private property. An NPDES permit would not be required for on-site required for discharge to the Rutherford Fork. To install and opera Alternative 3, a lease agreement must be negotiated with the landowner. Also, u feet of underground discharge piping must be maintained.

For Alternatives 3, 4, and 5, extensive administrative oversi proper operation and maintenance and overall performance of the pref treatment system would require long-term monitoring of influent and residuals, and analysis of treatment effectiveness. Five-year reviews wo long-term monitoring program. The tasks associated with coordinating and alternatives are feasible and implementable.

8.8 COST

The estimated costs for Alternatives 2 through 5 are included in T
include treatment systems for both areas of concern. Although Alternativ
estimated
costs, it does not meet the threshold criterion of compliance with ARARs.
expensive of the three alternatives that include groundwater treatment.
discharge
to the Rutherford Fork, which allows greater flexibility in the degree of
discharge
to the on-site ditches. Alternatives 4 and 5 provide for treatment for i
needed
for discharge to the on-site ditches. Alternative 4 is slightly less exp

The cost estimates contain a significant degree of uncertaint
The capital costs for each of the treatment alternatives have the gr
prices for the treatment units may be considerably lower after competitiv
discounts.
For the cost estimates presented in Section 7, installation costs were as
equipment capital costs; however, this assumption may prove to be conside
treatment system, installation costs ranged from 3 to 5 times the capital

O&M costs for the different treatment processes may also be s
is operational. The O&M costs for GAC are most uncertain and will affect
each
alternative. The assumed GAC usage rate (0.1 lbs. GAC exhausted per 1,00
based
on vendor information for a similar application with higher explosives co
rather than
the 100 æg/L or lower for northern boundary groundwater). This usag
different
at full-scale operation. The inorganics treatment processes (GMF, ion ex
have
similarly uncertain O&M costs because of the uncertain inorganics influen

8.9 STATE ACCEPTANCE

Overall, the Record of Decision is acceptable to the Tennesse
Conservation (TDEC). It is the understanding of TDEC that this interim r
control the
migration of contaminated groundwater off-site at the northern boundary w
this
understanding, the Army should be flexible in its location of extraction
capacities
to maximize contaminant of the groundwater contamination along the entire
within
OU3.

Table 8-1
Summary of Estimated Costs for Alternatives 2 Through

Alternative	Description	Costs in 1994 Dollars

		Capital Cost	Annual O&M Cost	
2	Limited Action	$64,000	$143,000	$2,
3	GMF/GAC	$5,290,000	$1,070,000	
4	Precipitation/GMF/GAC	$9,882,000	$1,544,000	
5	GMF/GAC/Ion Exchange	$11,262,000	$1,725,000	

8.10 COMMUNITY ACCEPTANCE

Comments and responses from the July 12, 1994 Public Meeting included in the Responsiveness Summary (Appendix A). All comments r were favorable toward the selection of Alternative 3. No written co Public Comment Period.

8.11 SUMMARY OF DETAILED EVALUATION

The following is a brief summary of the evaluated alternative

Alternative 1 would not be protective of human health and

Alternative 2 would provide limited protection of human h through the implementation of land use restrictions that would pr contaminated groundwater as drinking water. However, these measu long-term protection of human health and the environment and woul control the off-site migration of contaminated groundwater.

Alternatives 3, 4, and 5 would meet all ARARs and be prot environment. Implementation of these extraction/treatment altern migration of explosives compounds and reduce the levels of explos off-post groundwater.

Alternatives 4 and 5 provide additional treatment for ino water criteria for discharge into the on-site dicthes would be me require piping the treated water to the Rutherford Fork of the Ob effluent discharge criteria would be met.

Of the three alternatives that include groundwater treatm cost option. The cost of implementing Alternative 3 would be app much as the cost of implementing Alternatives 4 and 5.

Based on the comparative analysis of alternatives as presente remedy is Alternative 3.

9.0 SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the d alternatives, and public comments, the Army, with the concurrence of EPA determined that extraction of groundwater with treatment through the implementation GAC, and off-site surface water discharge) is the most appropriate remedy for cont northern boundary of MAAP in Tennessee.

This remedy includes the design and implementation of an inte human health and the environment. The goal of this remedial action is to the explosives compounds in groundwater through the implementation of land us the migration of contaminated groundwater off site, and to reduce the concent compounds in off-site groundwater. In addition, the action includes the and contaminant response to remediation measures. This remedial action will determine the effectiveness of this remedy and to ensure that hydraulic c plume is maintained. After the period of time necessary to arrive at a final d ROD for groundwater, which specifies the ultimate goal, remedy, and anticipated r be prepared. This interim remedial action system may be incorporated into t remedy for OU3 specified in the final ROD.

The implementation time for Alternative 3 is approximately 18-24 m includes the treatment system design and review, and preparation of bid p design phase, the system construction will begin. This includes selection of co suppliers, installation, and start up. Although this section presents details of th changes may be made based on the remedial design and construction processes.

9.1 EXTRACTION SYSTEMS

Alternative 3 will include extraction systems for the areas the northern boundary. Because of the limited data presently available conce horizontal extent of groundwater contamination in the off-post area, the locations o extraction rates have been determined. These parameters will be determin Design phase.

9.2 TREATMENT AND DISCHARGE COMPONENTS: ALTERNATIVE 3

This alternative would use GMF for the removal of suspended s contaminants. GAC would be used for the removal of explosive contaminant for discharge to surface water (see Figure 9-1). Treated water would be disc Rutherford

Fork of the Obion River.

Water from each extraction system will first be filtered usin percentage of 75% should adequately pretreat groundwater by capturing sus may reduce the efficiency of the subsequent GAC adsorption system. Besides r to levels acceptable for GAC, will also remove the suspended solids and asso groundwater.

<IMG SRC 0494199C>

After pretreatment with GMF, the pH of the aqueous stream may optimal adsorption with GAC. Groundwater pH at the northern boundar neutral pH of 7.0. Optimal GAC adsorption of explosives occurs at a occasional pH adjustment may be required.

Treatment with GAC will reduce the concentrations of explosiv water. The GAC system will be sized based on the flow rate of the e concentrations of explosives compounds. A contact time of approxima adequate for removal of the explosives compounds to the effluent dis will be disposed in a landfill or through reclamation companies whic supplement for industrial processes.

Treated water will be discharged to the Rutherford Fork of th Rutherford Fork allows greater flexibility in treatment system opera through a pipe installed below grade from the treatment plants to th discharged in accordance with the requirements of the NPDES permit i

9.3 MONITORING

A monitoring program will be developed and implemented during ensure that hydraulic control of the groundwater at the northern bou inward and upward gradient within the aquifer must exist to prevent contaminated groundwater at the northern boundary. Information necessary for thi

horizontal and vertical gradients in the groundwater alon

horizontal and vertical contaminant distributions;

changes in contaminant concentration or distribution over

effects of any modifications to the original interim resp

To provide this information, the groundwater containment perf include, at a minimum, the following: locations of new or existing sampling; frequency of water quality sampling; analytical parameters and analytical methods to be employed; field sampling methods; speci locations, methods, and frequencies using new or existing wells; and

The monitoring plan will include the specification of the tim assess the effectiveness of this interim remedy. Adjustments may th treatment systems, as indicated by the results of the evaluation. T be limited to, installation of additional extraction or monitoring w extraction or monitoring well locations, and increase or decrease in the extrac

9.3.1 Effluent Monitoring Program

A monitoring plan for the effluent from the treatment plant s during the interim response action to ensure that control of the eff water discharge. A monitoring program shall be developed during the periodic and/or continuous information on the chemical constituency

To provide this information, the effluent monitoring program following: analysis of composite samples for total suspended solids and explosives compounds (treatment plant influent concentrations will a parameters.)

9.4 INSTITUTIONAL CONTROLS

The Army will ensure protection of future users of groundwate supplemented with institutional controls to prevent ingestion of con of concern at the northern boundary. These institutional controls w

> The groundwater at the northern boundary will not be used the levels of contaminants are higher than health-based l MAAP Environmental Office review of all projects and leas usage at the facility. Any well installed within the fac

In addition, a continuing program of public awareness will be used t associated with contaminants that remain in groundwater along the no

9.5 REMEDIATION GOALS

The goal of this remedial action is to reduce the potential h aquifer to the extent practicable with the proposed technology. Act reduction in conjunction with natural attenuation in the aquifer wil contaminated groundwater does not adversely affect future groundwate controls will be used to prevent future usage of contaminated ground awareness of the site conditions.

The remediation goals for this action are to reduce the level groundwater to the chemical-specific, risk-based groundwater cleanup treated effluent will be discharged to the Rutherford Fork of the Ob chemical-specific effluent discharge limits listed in Table 7-2.

9.5.1 Achievement of Remediation Goals

Results from studies performed on explosives-contaminated gro elsewhere indicate that groundwater may be treated to levels below t (Table 7-2) using GAC. Therefore, treatment of northern boundary gr implementation of the selected remedy will reduce the hazards posed

9.6 COST OF THE SELECTED REMEDY

The total capital cost for Alternative 3 has been estimated t costs are estimated at $1,070,000 per year. The total present worth estimated at $22,739,000. The cost estimates are preliminary and ar were developed based on construction unit costs and vendor informati Table 9-1.

The design and construction of the treatment system will take This time estimate includes the treatment system design and review, selection of contractors and equipment suppliers, construction, equi

Assumptions were made about several factors that affect the t alternative. The major assumption for this cost estimate is the tre corresponding equipment sizes. A flow rate of 600 gpm has been assu should be noted that these are the highest flow rates under consider of the extraction wells, the flow rates may be much less. A reducti flow rate (a total of 1,200 gpm) would lead to much lower constructi system.

Other assumptions include:

Influent contaminant concentrations have been estimated f concentrations are lower than those assumed, then the ope would be reduced. It is expected that the influent conce those estimated, rather than higher.

Installation costs of treatment systems have been assumed of the equipment. The actual installation costs may be h

Health and safety considerations. For the cost estimate, assumed to be 10% of the capital subtotal. Based on actu actual investigation and construction methods, health and higher or lower costs.

Table 9-1
Summary of Costs for the Selected Remedy: Altern
Extraction/GMF/GAC/Discharge to the Rutherford

ITEM	COST
Capital Costs	
Administrative Actions	
Site Preparation and General Actions	

Extraction & Conveyance Systems

Treatment Buildings & Equipment

Discharge Systems

Long-Term Monitoring

Contingencies (40% of Capital Subtotal)

Engineering & Design (25% of Capital Subtotal plus Contingencies)

Equipment Installation Costs (100% of treatment system costs)

Permitting & Coordination

Annual Operation and Maintenance Costs

Program Oversight

Extraction & Treatment Systems

Long-Term Monitoring & Five-Year Reviews

Contingencies (25% of Annual Subtotal)

Present Worth of Annual O&M (30 years, 5% discount rate)

Total Present Worth (Capital and Annual Costs, 30 years at 5% discount rate)

10.0 STATUTORY DETERMINATIONS

Executive Order 12580 delegates the authority for carrying ou Sections 104(a), (b), and (c)(4) and 121 to the Department of Defens Section 120 of the Act. Therefore, under its legal authorities, the

MAAP

is to undertake a remedial action that achieves adequate protection In addition, Section 121 of CERCLA estabilshes several other statuto These specify that when complete, the final remedial action for the comply with applicable or relevant and appropriate environmental sta and State environmental laws unless a statutory waiver is justified. effective and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Finally, the statut that employ treatment that permanently and significantly reduce the hazardous substances as their principal element. The following sect remedy is consistent with these statutory requirements as far as pra action.

10.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy will control the migration of explosives area and reduce the levels of explosives compounds in off-post groun contaminated groundwater, treats it to remove contaminants below the listed in Table 7-2 of this ROD, and discharges the treated water to quality will be improved by implementation of the selected remedy an will be significantly reduced. No unacceptable short-term risks or implementation of the remedy.

Although contamination will remain in the groundwater above h controls will prevent contact with these contaminants until a final

10.2 COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The ARARs for this remedial action include action-specific, c requirements. TBC guidances are also listed.

10.2.1 Chemical-Specific ARARs and To-Be-Considered Guidance

This remedy will be operated in accordance with all Federal a facility requirements.

10.2.1.1 Groundwater Quality.

The MCL for nitrate (40 CFR 141.23) is a relevant and appropr

EPA Health Advisories and health-based cleanup standards calc Doses and Cancer Slope Factors (listed in Table 7-1) are to-b

10.2.1.2 Surface Water Discharge.

Effluent discharge limits assigned by the State of Tennessee applicable. These limits are based on Federal Ambient Water under the Clean Water Act (33 U.S.C. 1314(a)(1)) and the Rule of Environment and Conservation (Chapter 1200-4-3). Prelimin presented in Table 7-2. For discharge to the Rutherford Fork required. The permit limits are applicable requirements.

10.2.2 Location-Specific ARARs

RCRA requirements regarding the location of hazardous waste t appropriate. These requirements cover placement on a floodpl placement near a fault (40 CFR 264.18).

Regulations that require Federal actions to protect floodplai protect wetlands (40 CFR 6, Appendix A) are relevant and appr

10.2.3 Action-Specific ARARs

The disposal of sludges and spent GAC will be performed in co

(40 CFR 260 - 270), which are relevant and appropriate.

10.3 COST EFFECTIVENESS

By implementing GAC for the treatment of explosives in ground represents the best cost/benefit ratio, being only incrementally mor while providing greater protection to human health and the environme

10.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES (OR RESOURCE RECOVERY TECHNOLOGIES) TO THE MAXIM EXTENT PRACTICABLE

The selected remedy is not designed or expected to be the fin the site because upgradient groundwater is contaminated with higher However, the remedy represents the best balance of trade-offs among scope of the action. The selected remedy permanently removes contaminants and discharges the treated water to nearby surface water. GAC will groundwater in this remedy.

The remedy was selected with consideration given to the five remedy is the most effective alternative because it removes both sus organic contaminants from the groundwater. This remedy also reduces of the groundwater through active extraction and treatment. Short-t large role in the selection of a remedy because all alternatives req system and a treatment plant. The selected remedy, however, is slig because this remedy does not generate a large quantity of residuals as do the alternatives with secondary treatment for inorganic analys costly of the active treatment alternatives and will protect human h

Of the five primary balancing criteria discussed above, long- and cost were the most decisive factors. The selected remedy provid attaining the required degree of treatment effectiveness. EPA, the accept this alternative.

10.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The selected remedy satisfies the statutory preference to uti technologies to the maximum extent practicable. A proven technology organic contaminants from groundwater such that the treatment system contaminants above the discharge levels presented in Section 9.5.

Contaminants in the groundwater which have been detected abov pose a potential threat to the health of future residents if the are extracting the contaminated groundwater, treating it through the use remediation goals, and discharging it to surface water, this remedy off-site groundwater conditions and reducing the potential health ri

This interim remedy only addresses groundwater at the norther address source areas or other areas of contaminated groundwater. Th concern will be addressed by the Army.

11.0 DOCUMENTATION OF SIGNIFICANT DIFFERENCES

The Proposed Plan for Northern Boundary Groundwater, Milan A released for public comment on July 1, 1994. The Proposed Plan iden GMF/GAC/Discharge to the Rutherford Fork, as the preferred alternati State of Tennessee reviewed and considered all comments received during th of these comments, it was determined that no significant changes to identified in the Proposed Plan, were necessary.

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APPENDIX A
Responsiveness Summary

Comments Received at the Public Meeting/Availability Session
July 12, 1994

I'm Bob Perkins, resident of Milan, editor and publisher of the Mila attending these meetings for several years and I think it's very commendable the pr in this cleanup effort. It seems to me and the community that the Army some the efforts in spending all this money, but we appreciate the efforts they go hazards. We think they are right on target and we appreciate their good work.

I'm Robert Vawter. My comment on - I prefer using object number 3, conservative. I'm also on the Board of Utilities here, too. And I liked it sounded this afternoon. It was very satisfying. I was very pleased as a that's all I've got to say.

My name is Keaton Webb. I am Superintendent of the Utilities Department reviewed with Randy Cerar the proposed cleanup of the groundwater on the Northern alternatives that we have discussed and the presentations that I have obs alternative 3 represents the most feasible and economical solution to thi would favor alternative 3.

My name is Bill Ownby. I've just gone through the review of what th Arsenal. Right now, I'm not as familiar with it as I would like to be and that's w about it so I don't really have anything scientific that I could use or say abo drinking water up until they closed the Milan well. I've been on bought have a big interest in seeing that the water is cleaned up, whether this is th have no idea. But I'm just not getting involved with it so I can become more

My name is Betty Williamson and I approve of the plans they have for the

Bill Bruce. I'm with the Milan Education System. I'm rather impres particularly Nora's explanation to Dr. McAdoo and I. It seems to be well developed. We're interested as Dr. McAdoo mentioned in the long-range consideration they

have looked into that. I'm very anxious to see that we are addressing a
my
students have expressed concerns and I assume those concerns come from th
able to through the work of this committee, address those concerns and I
biggest problems - is a lack of information.

Micky McAdoo. I'm a local physician here in Milan. Likewise, I hav
that's been disseminated tonight and just talking with Nora about the ove
areas
of concern, the plan of monitoring the circumference of the Milan Army Am
area,
plans to treat the groundwater, and also concerned about the long range e
Milan
being a home for several families, looking at what 30 to 50 years of wate
have
on people to make a decision to settle here, raise their families and con
Milan.
I think that the immediate as well as long-range plan is one concern that
that
this is an open public forum that doesn't appear to have any secrets, tha
everything, that we're not basically looking at tip of an iceberg or some
consume the community but something that the community can feel good abou
addressed
properly and feel safe when they turn on their faucets and obtain some dr
Tennessee. So, I look forward to seeing this committee go forward.

My name is Paul Phelan. I'm from Trenton. I am a State Representat
Counties. I've been to the first meeting. I came over here - I wa
of the problem, the nature of the problem, how the contamination occ
moving,
and what kind of time schedule that it was moving as far as space pe
through the pavilion or whatever, the little program you've got set
alternative? I agree with the choice, I do. I believe it was alter
now
to go with alternative 3 and maybe the Board can kinda stay on top o
on further down the road that we need to do something else, well we
somewhere and I totally agree with alternative 3.

I'm John Fuqua and I came down to the meeting tonight looking at the
I think the proposal we are selecting or looking at is probably the
do. We can spend billions of dollars on this kind of project, but w
do to continue to treat and clean up not only this area but all area
way I stand right now.

Responses to Public Comments

In response to the comment made by Mr. Parkins, the Army would like
every
effort is being made to appropriately administer funds toward clean-
human health and the environment. This project represents a high pr
groundwater at the northern boundary of the facility has been affect

compounds from the facility. The primary goal of the environmental
community from contaminants that originated at the facility.

In response to the comments from Mr. Ownby and Dr. McAdoo, the Army
project is not connected to the detection of explosives compounds in
groundwater from OU3 is migrating toward the north, and not toward t
problem of explosives compounds in the Milan city wells, the Army is
Milan

for replacement of the production wells and maintenance of the new w